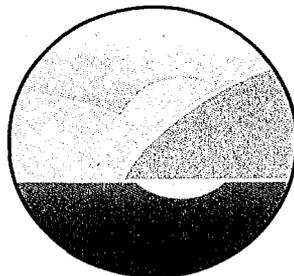


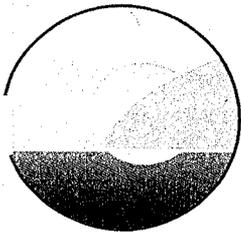


Particulate Emissions Test Report

U. S. Steel Gary Works
No. 14 Blast Furnace
Casthouse Baghouse Stack
March 19, 2009
Gary, Indiana

Platt Environmental Services, Inc.





Platt Environmental Services, Inc.

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630-521-9494 fax

Particulate Emissions Test Report

U. S. Steel Gary Works
No. 14 Blast Furnace
Cathouse Baghouse Stack
March 19, 2009
Gary, Indiana

Report Submittal Date
April 15, 2009

Prepared By
Platt Environmental Services

Report No. M091105B

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1.0 Introduction

PLATT ENVIRONMENTAL SERVICES (PES) conducted a particulate emissions test program for U.S. Steel Gary Works in Gary, Indiana on the No. 14 Blast Furnace Casthouse Baghouse Stack on March 19, 2009. This report summarizes the results of the test program and test methods used.

The test locations, test dates and test parameters are summarized below.

Test Overview

Test Location	Test Date	Test Parameters
No.14 Blast Furnace Casthouse Baghouse Stack	March 19, 2009	Filterable Particulate Matter

The identification of individuals associated with the test program is summarized below.

Location	Address	Contact
Test Facility	U.S. Steel Gary Works One North Broadway Gary, Indiana 46402	Jim Alexander Manager Environmental Air Compliance US Steel Gary Works (219) 888-3387
Testing Company Representative	Platt Environmental Services, Inc. 1080 Breuckman Drive Crown Point, Indiana 46307	Mr. Christopher Trezak (630) 521-9400 (phone) ctrezak@plattenv.com

The test crew consisted of Messrs. D. Runyan, A. Schavey, and C. Trezak. The purpose of the test program was to demonstrate compliance with applicable emissions limits listed in Table 1.

2.0 Executive Summary

Selected results of the test program are summarized below, in Table 1. A complete summary of emission test results follows the narrative portion of this report.

Table 1
Test Results

Test Location	Test Parameter	Emission Limit ¹ grains/dscf	Emission Rate grains/dscf	Opacity Limit ¹	Opacity *
No.14 Blast Furnace Casthouse Baghouse Stack	Filterable Particulate Matter	0.01	0.003	20% (6 minute average)	0.0

¹ Emission Limit under 40 CFR 63, Subpart FFFFF, Table 1

*Opacity readings were performed by OCS Environmental, Inc. personnel

3.0 Test Methodology

Emissions testing was conducted following the methods specified in 40 CFR, Part 60, Appendix A. Schematics of the sampling trains used are included in the Appendix. Copies of field data sheets and/or analyzer print-outs for each test run are included in Appendix.

The following methodologies were used during the test program:

Method 1 Traverse Point Determination

Test measurement points were selected in accordance with Method 1. The characteristics of each measurement location are summarized below, in Table 2.

Table 2
Sample Point Selection

Locations	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
No.14 Blast Furnace Casthouse Baghouse Stack	> 0.5	>2.0	Particulate	24

Method 2 Volumetric Flowrate Determination

Gas velocity was measured following Method 2, for purposes of calculating stack gas volumetric flow rate. An S-type pitot tube, differential pressure gauge, thermocouple and temperature readout were used to determine gas velocity at each sample point. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data is presented in the Appendix.

Method 3A Oxygen (O₂)/Carbon Dioxide (CO₂) Determination

Stack gas molecular weight was determined in accordance with Method 3A. Servomex analyzers were used to determine stack gas oxygen and carbon dioxide content and, by difference, nitrogen content. All of the equipment used was calibrated in accordance with the specifications of the Method.

Method 5 Filterable Particulate Determination

Stack gas filterable particulate concentrations and emission rates were determined in accordance with Method 5. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate, as specified in the Method. Particulate matter in the sample probe was recovered using an acetone wash. The probe wash and filter catch were analyzed by PES personnel in accordance with the method.

Method 9 Visible Emission Determination

Visible emissions were determined in accordance with Method 9. The observer stood at a distance providing a clear view of the emissions with the sun oriented in the 140° sector to their back. As much as possible, the line of vision was approximately perpendicular to the plume direction.

The line of sight was approximately perpendicular to the longer axis of the outlet.

Opacity observations were made at the point of greatest opacity in the portion of the plume where condensed water vapor was not present. Observations were made at 15-second intervals for the duration of the test run.

Visible emissions observations were conducted and recorded by Messrs. Danny Walsh and Jimmie Johnson of OCS Environmental, Inc. Each is a certified visual emissions observer, and copies of their certifications are presented in the Appendix.

4.0 Test Result Summaries

Company: US Steel Gary Works
Plant: No. 14 Blast Furnace
Test Location: Casthouse Baghouse Stack
Test Method: M5

Source Condition	1 Fan Only	1 Fan Only	1 Fan Only	
Date	3/19/09	3/19/09	3/19/09	
Start Time	8:03	9:30	10:57	
End Time	9:17	10:44	12:11	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	88.7	79.8	78.5	82.3
Flue Gas Moisture, percent by volume	0.8%	0.8%	0.9%	0.8%
Average Flue Pressure, in. Hg	29.88	29.88	29.88	29.88
Gas Sample Volume, dscf	74.985	70.498	70.187	71.890
Average Gas Velocity, ft/sec	42.612	43.587	43.225	43.141
Gas Volumetric Flow Rate, acfm	339,358	347,120	344,239	343,572
Gas Volumetric Flow Rate, dscfm	323,522	336,492	334,107	331,374
Average %CO ₂ by volume, dry basis	0.1	0.1	0.1	0.1
Average %O ₂ by volume, dry basis	20.9	20.9	20.9	20.9
Isokinetic Variance	101.4	101.7	101.9	101.7
Filterable PM (Method 5)				
grains/acf	0.0035	0.0023	0.0016	0.0025
grains/dscf	0.0036	0.0024	0.0017	0.0026
lb/hr	10.043	6.881	4.848	7.257

5.0 Process Data

Production data and fuel use data was recorded by plant personnel during each test run in order to correlate emission rates to production and fuel use. Production data and fuel use data is on file at the facility.

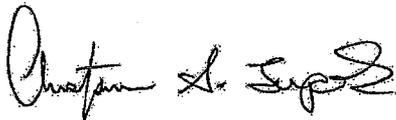
6.0 Conclusion and Certification

PLATT ENVIRONMENTAL SERVICES is pleased to have been of service to U.S. Steel Gary Works. If you have any questions regarding this test report, please do not hesitate to contact us at 630-521-9400.

CERTIFICATION

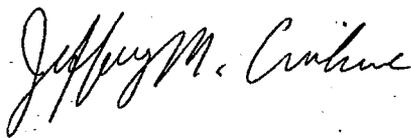
As project manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results, and the test program was performed in accordance with the methods specified in this test report.

PLATT ENVIRONMENTAL SERVICES



Christopher S. Trezak

Program Manager

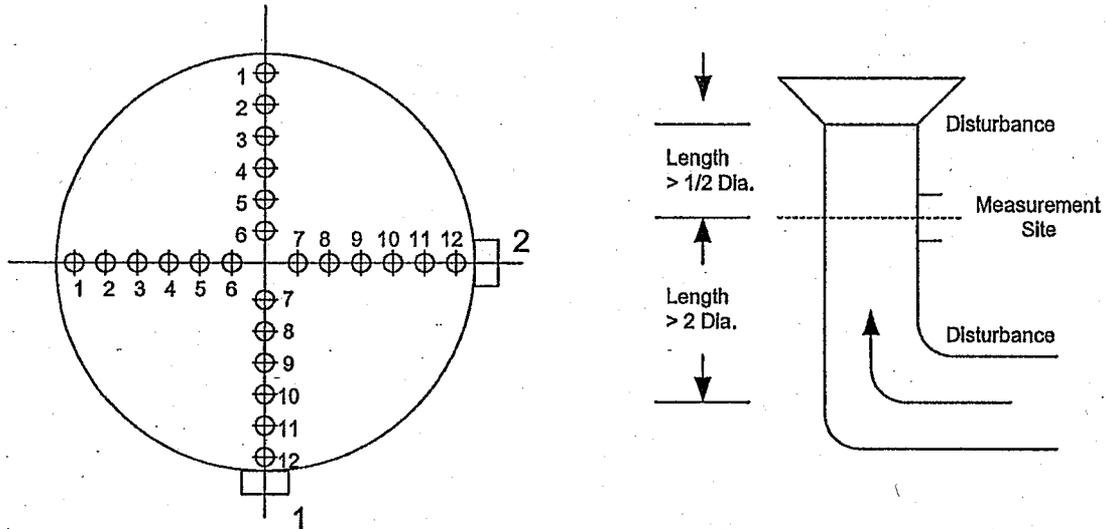


Jeffrey M. Crivlare

Quality Assurance

APPENDIX

EQUAL AREA TRAVERSE FOR ROUND DUCTS



Job: US Steel Gary Works

No. 14 Blast Furnace

Gary, Indiana

Date: March 19, 2009

Test Location: Casthouse Baghouse Stack

Stack Diameter: 13.0 Feet

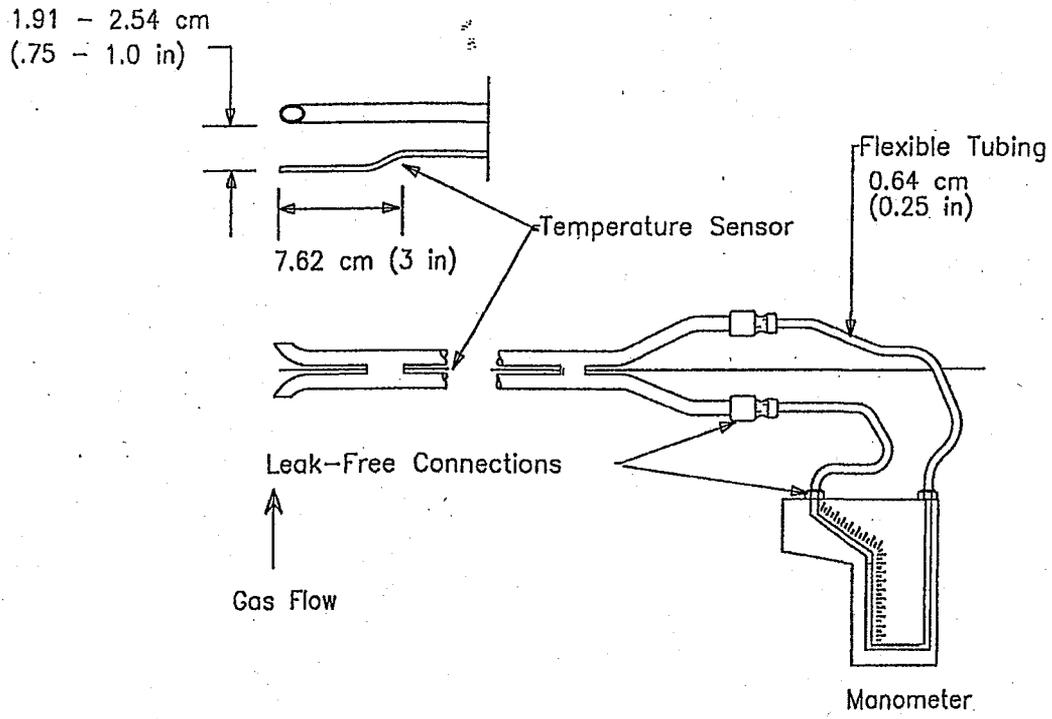
Stack Area: 132.732 Square Feet

No. of Points : 12

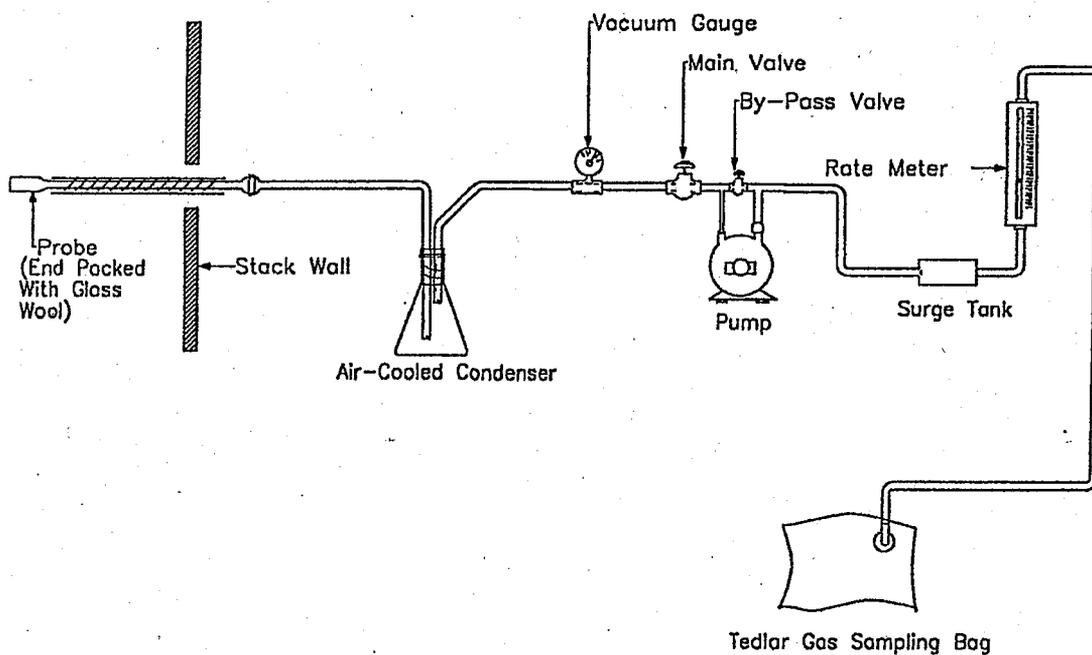
No. of Ports: 2

Port Length: 7 Inches

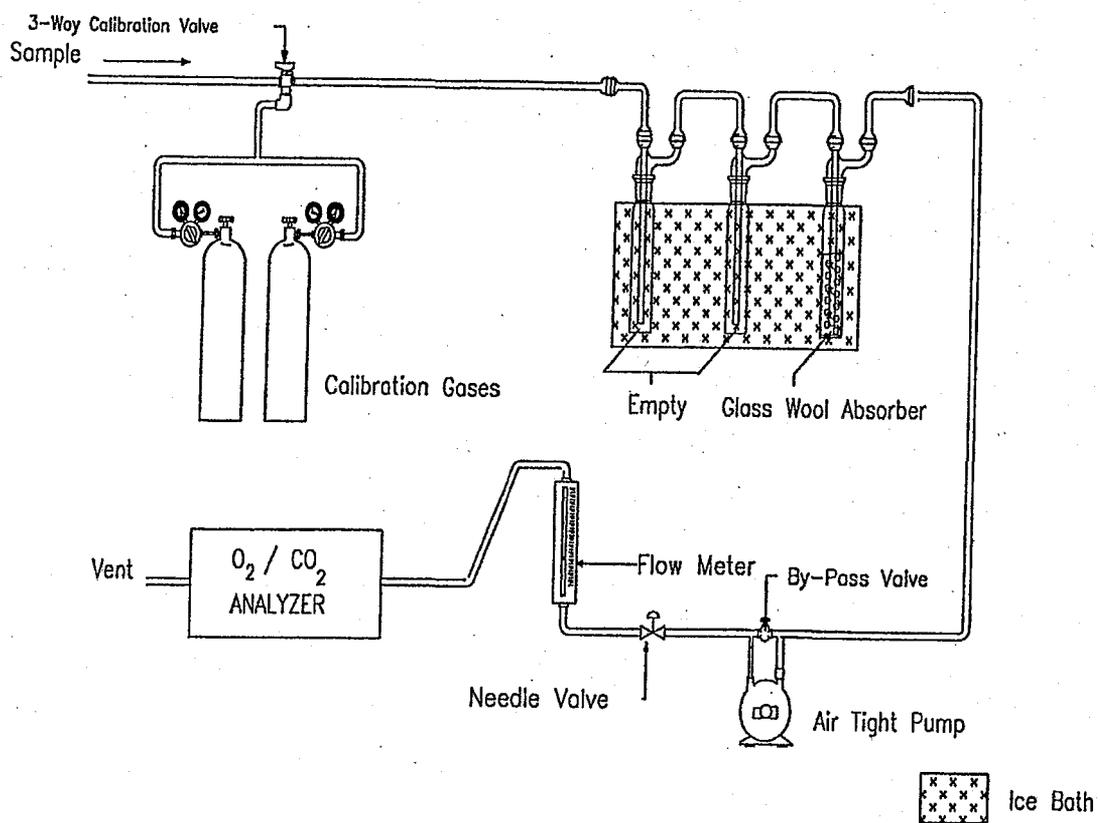
USEPA Method 2 - S-Type Pitot Tube Diagram



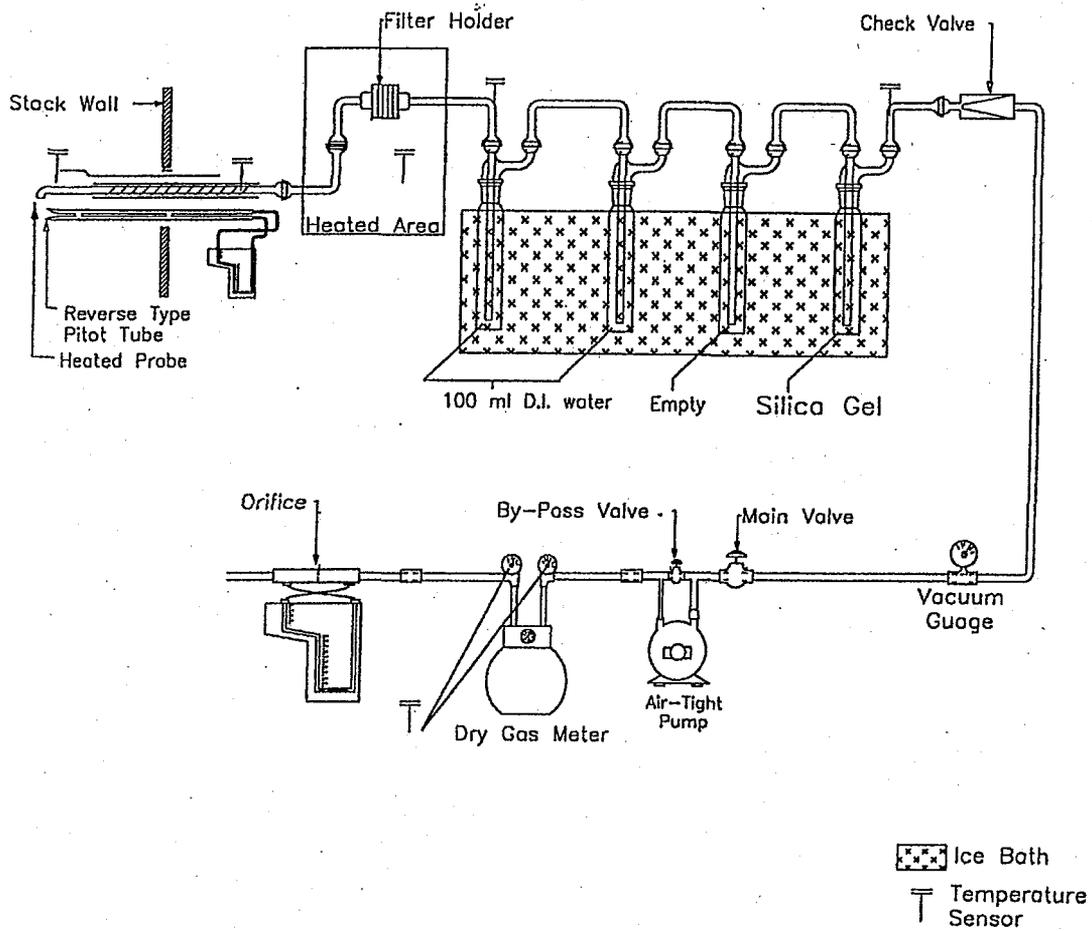
USEPA Method 3 - Integrated Oxygen/Carbon Dioxide Sample Train Diagram



USEPA Method 3A - Oxygen and Carbon Dioxide Sample Train Diagram



USEPA Method 5 - Particulate Matter Sample Train Diagram



PLATT ENVIRONMENTAL SERVICES, INC.

Particulate Nomenclature

- A = Cross-sectional area of stack or duct, square feet
 A_n = Cross-sectional area of nozzle, square feet
 B_{ws} = Water vapor in gas stream, by volume
 C_a = Acetone blank residue concentration, g/g
 C_{acf} = Concentration of particulate matter in gas stream at actual conditions, gr/acf
 C_p = Pitot tube coefficient
 C_s = Concentration of particulate matter in gas stream, dry basis, corrected to standard conditions, gr/dscf
 IKV = Isokinetic sampling variance, must be $90.0\% \leq IKV \leq 110.0\%$
 M_d = Dry molecular weight of gas, lb/lb-mole
 M_s = Molecular weight of gas, wet basis, lb/lb-mole
 M_w = Molecular weight of water, 18.0 lb/lb-mole
 m_a = Mass of residue of acetone after evaporation, grams
 P_{bar} = Barometric pressure at testing site, inches mercury
 P_g = Static pressure of gas, inches mercury (Inches water/13.6)
 P_s = Absolute pressure of gas, inches mercury = $P_{bar} + P_g$
 P_{std} = Standard absolute pressure, 29.92 inches mercury
 Q_{acfm} = Actual volumetric gas flow rate, acfm
 Q_{sd} = Dry volumetric gas flow rate corrected to standard conditions, dscfh
 R = Ideal gas constant, 21.85 inches mercury cubic foot/ $^{\circ}$ R-lb-mole
 T_m = Dry gas meter temperature, $^{\circ}$ R
 T_s = Gas temperature, $^{\circ}$ R
 T_{std} = Absolute temperature, 528 $^{\circ}$ R
 V_a = Volume of acetone blank, ml
 V_{aw} = Volume of acetone used in wash, ml
 W_a = Weight of residue in acetone wash, grams
 m_n = Total amount of particulate matter collected, grams
 V_{1c} = Total volume of liquid collected in impingers and silica gel, ml
 V_m = Volume of gas sample as measured by dry gas meter, dcf
 $V_{m(std)}$ = Volume of gas sample measured by dry gas meter, corrected to standard conditions, dscf
 v_s = Gas velocity, ft/sec
 $V_{w(std)}$ = Volume of water vapor in gas sample, corrected to standard conditions, scf
 Y = Dry gas meter calibration factor
 ΔH = Average pressure differential across the orifice meter, inches water
 Δp = Velocity head of gas, inches water
 ρ_a = Density of acetone, 0.7855 g/ml (average)
 ρ_w = Density of water, 0.002201 lb/ml
 θ = Total sampling time, minutes
 K_1 = 17.647 $^{\circ}$ R/in. Hg
 K_2 = 0.04707 ft³/ml
 K_4 = 0.09450/100 = 0.000945
 K_p = Pitot tube constant, $85.49 \frac{\text{ft}}{\text{sec}} \left[\frac{(\text{lb/lb-mole})(\text{in.Hg})}{(^{\circ}\text{R})(\text{in.H}_2\text{O})} \right]^{1/2}$
 %EA = Percent excess air
 %CO₂ = Percent carbon dioxide by volume, dry basis
 %O₂ = Percent oxygen by volume, dry basis
 %CO = Percent carbon monoxide by volume, dry basis
 %N₂ = Percent nitrogen by volume, dry basis
 0.264 = Ratio of O₂ to N₂ in air, v/v
 28 = Molecular weight of N₂ or CO
 32 = Molecular weight of O₂
 44 = Molecular weight of CO₂
 13.6 = Specific gravity of mercury (Hg)

PLATT ENVIRONMENTAL SERVICES, INC.

Particulates Calculation Formulas

1. $V_{w(std)} = V_{lc} \left(\frac{\rho_w}{M_w} \right) \left(\frac{RT_{std}}{P_{std}} \right) = K_2 V_{lc}$
2. $V_{m(std)} = V_m Y \left(\frac{T_{std}}{T_m} \right) \left(\frac{(P_{bar} + (\frac{\Delta H}{13.6}))}{P_{std}} \right) = K_1 V_m Y \frac{(P_{bar} + (\frac{\Delta H}{13.6}))}{T_m}$
3. $B_{ws} = \frac{V_{w(std)}}{(V_{m(std)} + V_{w(std)})}$
4. $M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2)$
5. $M_s = M_d(1 - B_{ws}) + 18.0(B_{ws})$
6. $C_a = \frac{m_a}{V_a \rho_a}$
7. $W_a = C_a V_{aw} \rho_a$
8. $C_{acf} = 15.43 K_i \left(\frac{m_n P_s}{(V_{w(std)} + V_{m(std)}) T_s} \right)$
9. $C_s = (15.43 \text{ grains/gram}) (m_n / V_{m(std)})$
10. $v_s = K_p C_p \sqrt{\frac{\Delta P T_s}{P_s M_s}}$
11. $Q_{acfm} = v_s A (60 \frac{\text{sec}}{\text{min}})$
12. $Q_{sd} = (3600 \frac{\text{sec}}{\text{hr}}) (1 - B_{ws}) v_s \left(\frac{T_{std} P_s}{T_s P_{std}} \right) A$
13. $E \text{ (emission rate, lbs/hr)} = Q_{sd} (C_s / 7000 \text{ grains/lb})$
14. $IKV = \frac{T_s V_{m(std)} P_{std}}{T_{std} v_s \theta A_n P_s 60 (1 - B_{ws})} = K_4 \frac{T_s V_{m(std)}}{P_s v_s \theta A_n (1 - B_{ws})}$
15. $\%EA = \left(\frac{\%O_2 - (0.5 \%CO)}{0.264 \%N_2 - (\%O_2 - 0.5 \%CO)} \right) \times 100$

PLATT ENVIRONMENTAL SERVICES, INC.

Volumetric Flow Nomenclature

- A = Cross-sectional area of stack or duct, ft^2
 B_{ws} = Water vapor in gas stream, proportion by volume
 C_p = Pitot tube coefficient, dimensionless
 M_d = Dry molecular weight of gas, $\text{lb}/\text{lb-mole}$
 M_g = Molecular weight of gas, wet basis, $\text{lb}/\text{lb-mole}$
 M_w = Molecular weight of water, $18.0 \text{ lb}/\text{lb-mole}$
 P_{bar} = Barometric pressure at testing site, in. Hg
 P_g = Static pressure of gas, in. Hg (in. $\text{H}_2\text{O}/13.6$)
 P_s = Absolute pressure of gas, in. Hg = $P_{bar} + P_g$
 P_{std} = Standard absolute pressure, 29.92 in. Hg
 Q_{acfm} = Actual volumetric gas flow rate, acfm
 Q_{sd} = Dry volumetric gas flow rate corrected to standard conditions, dscf/hr
 R = Ideal gas constant, $21.85 \text{ in. Hg-ft}^3/\text{°R-lb-mole}$
 T_s = Absolute gas temperature, °R
 T_{std} = Standard absolute temperature, 528°R
 v_s = Gas velocity, ft/sec
 $V_{w(std)}$ = Volume of water vapor in gas sample, corrected to standard conditions, scf
 Y = Dry gas meter calibration factor
 Δp = Velocity head of gas, in. H_2O
 K_1 = $17.647 \text{ °R}/\text{in. Hg}$
 $\%EA$ = Percent excess air
 $\%\text{CO}_2$ = Percent carbon dioxide by volume, dry basis
 $\%\text{O}_2$ = Percent oxygen by volume, dry basis
 $\%\text{N}_2$ = Percent nitrogen by volume, dry basis
 0.264 = Ratio of O_2 to N_2 in air, v/v
 0.28 = Molecular weight of N_2 or CO , divided by 100
 0.32 = Molecular weight of O_2 divided by 100
 0.44 = Molecular weight of CO_2 divided by 100
 13.6 = Specific gravity of mercury (Hg)

PLATT ENVIRONMENTAL SERVICES, INC.

Volumetric Air Flow Calculations

$$V_m(\text{std}) = 17.647 \times V_m \times \left[\frac{(P_{\text{bar}} + (\frac{DH}{13.6}))}{(460 + T_m)} \right] \times Y$$

$$V_w(\text{std}) = 0.0471 \times V_{lc}$$

$$B_{ws} = \left[\frac{V_w(\text{std})}{V_w(\text{std}) + V_m(\text{std})} \right]$$

$$M_d = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + [0.28 \times (100 - \%CO_2 - \%O_2)]$$

$$M_s = M_d \times (1 - B_{ws}) + (18 \times B_{ws})$$

$$V_s = \sqrt{\frac{(T_s + 460)}{M_s \times P_s}} \times \sqrt{DP} \times C_p \times 85.49$$

$$A_{cfm} = V_s \times \text{Area (of stack or duct)} \times 60$$

$$S_{cfm} = A_{cfm} \times 17.647 \times \left[\frac{P_s}{(460 + T_s)} \right]$$

$$S_{cfh} = S_{cfm} \times 60 \frac{\text{min}}{\text{hr}}$$

acfm = actual cubic feet per minute

scfm = standard cubic feet per minute

scfh = standard cubic feet per hour

Cp = pitot tube correction factor

Ps = absolute flue gas pressure

Ms = molecular weight of gas (lb/lb mole)

Md = dry molecular weight of gas (lb/lb mole)

Bws = water vapor in gas stream proportion by volume

PLATT ENVIRONMENTAL SERVICES, INC.

MOISTURE CALCULATIONS

$$V_{wc(std)} = \frac{(V_f - V_i) \rho_w R T_{std}}{P_{std} M_w} = 0.04707(V_f - V_i)$$

$$V_{wsg(std)} = \frac{(W_f - W_i) R T_{std}}{P_{std} M_w} = 0.04715(W_f - W_i)$$

$$V_{m(std)} = 17.64 V_m Y \frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}$$

$$B_{ws} = \frac{V_{wc(std)} + V_{wsg(std)}}{V_{wc(std)} + V_{wsg(std)} + V_{m(std)}}$$

Where:

- B_{ws} = Water vapor in gas stream, proportion by volume
- M_w = Molecular weight of water, 18.015 lb/lb-mole
- P_{bar} = Barometric pressure at the testing site, in. Hg
- P_{std} = Standard absolute pressure, 29.92 in. Hg
- R = Ideal gas constant, $0.048137 \text{ (in. Hg)(ft}^3\text{)/(g-mole)(}^\circ\text{R)} = [21.8348 \text{ (in. Hg)(ft}^3\text{)/(lb-mole)(}^\circ\text{R)}] / 453.592 \text{ g-mole/lb-mole}$
- T_m = Absolute average dry gas meter temperature, $^\circ\text{R}$.
- T_{std} = Standard absolute temperature, 528 $^\circ\text{R}$
- V_f = Final volume of condenser water, ml
- V_i = Initial volume of condenser water, ml
- V_m = Dry gas volume measured by dry gas meter, dcf
- $V_{m(std)}$ = Dry gas volume measured by dry gas meter, corrected to standard conditions, scf
- $V_{wc(std)}$ = Volume of condensed water vapor, corrected to standard conditions, scf
- $V_{wsg(std)}$ = Volume of water vapor collected in silica gel, corrected to standard conditions, scf
- W_f = Final weight of silica gel, g
- W_i = Initial weight of silica gel, g
- Y = Dry gas meter calibration factor
- ΔH = Average pressure exerted on dry gas meter outlet by gas sample bag, in. H_2O
- ρ_w = Density of water, 0.9982 g/ml
- 13.6 = Specific gravity of mercury (Hg)
- 17.64 = T_{std}/P_{std}
- 0.04707 = ft^3/ml 0.04715 = ft^3/g

Company: US Steel Gary Works
 Plant: No. 14 Blast Furnace
 Test Location: Casthouse Baghouse Stack
 Run: 1
 Date: 3/19/2009

Dry Molecular Weight

$$Md = 0.44 \times (\%CO_2) + 0.32 \times (\%O_2) + 0.28 \times \%N_2$$

$$\%CO_2 = \underline{0.1} \quad \%O_2 = \underline{20.9} \quad \%N_2 = \underline{79.0}$$

$$Md = \underline{28.85}$$

Wet Molecular Weight

$$Ms = Md \times (1 - Bws) + (18.0 \times Bws)$$

$$Md = \underline{28.85} \quad Bws = \underline{0.008}$$

$$Ms = \underline{28.77}$$

Meter Volume at Standard Conditions

$$Vm(std) = 17.647 \times Y \times Vm \times \frac{(Pbar + DH/13.6)}{Tm}$$

$$Y = \frac{\underline{0.994}}{\underline{3.03}} \quad Vm = \frac{\underline{72.394}}{\underline{510.0}} \quad Pbar = \underline{29.89}$$

$$Vm(std) = \underline{74.985}$$

Volume of Water Vapor Condensed

$$Vw(std) = 0.0471 \times (\text{net H}_2\text{O gain})$$

$$\text{Net H}_2\text{O} = \underline{12.5}$$

$$Vw(std) = \underline{0.589}$$

Moisture Content

$$Bws = \frac{Vwc(std)}{Vwc(std) + Vm(std)}$$

$$Vw(std) = \underline{0.589} \quad Vm(std) = \underline{74.985}$$

$$Bws = \underline{0.008}$$

Company: US Steel Gary Works
 Plant: No. 14 Blast Furnace
 Test Location: Casthouse Baghouse Stack
 Run: 1
 Date: 3/19/2009

Average Duct Velocity

$$V_s = 85.49 \times C_p \times \text{Sqrt DP (avg)} \times (T_s \text{ (avg)} / (P_s \times M_s))^{1/2}$$

$$C_p = \frac{0.840}{29.88} \quad T_s \text{ (avg)} = \frac{548.7}{28.77} \quad \text{Sqrt DP (avg)} = \frac{0.743}{28.77}$$

$$V_s = \frac{42.61}{28.77}$$

Volumetric Flow Rate (Actual Basis)

$$Q = V_s \times A \times 60$$

$$V_s = \frac{42.61}{28.77} \quad A = \frac{132.732}{28.77}$$

$$Q = \frac{339358}{28.77}$$

Volumetric Flow Rate (Standard Basis)

$$Q_{std} = 17.647 \times Q \times \frac{P_s}{T_s \text{ (avg)}}$$

$$Q = \frac{339358}{28.77} \quad P_s = \frac{29.88}{28.77} \quad T_s \text{ (avg)} = \frac{548.7}{28.77}$$

$$Q_{std} = \frac{326062}{28.77}$$

Volumetric Flow Rate (Standard Dry Basis)

$$Q_{std}(\text{dry}) = Q_{std} \times (1 - B_{ws})$$

$$Q_{std} = \frac{326062}{28.77} \quad B_{ws} = \frac{0.008}{28.77}$$

$$Q_{std}(\text{dry}) = \frac{323522}{28.77}$$

Isokinetic Variation:

$$\%ISO = \frac{0.0945 \times T_s \times V_m(\text{std})}{V_s \times \theta \times A_n \times P_s \times (1 - B_{ws})}$$

$$T_s = \frac{548.7}{28.77} \quad V_m(\text{std}) = \frac{74.985}{28.77} \quad V_s = \frac{42.612}{28.77}$$

$$A_n = \frac{0.0003801}{28.77} \quad \theta = \frac{72.0}{28.77} \quad P_s = \frac{29.88}{28.77}$$

$$B_{ws} = \frac{0.008}{28.77}$$

$$\%ISO = \frac{101.4}{28.77}$$

Company: US Steel Gary Works
Plant: No. 14 Blast Furnace
Test Location: Casthouse Baghouse Stack
Run: 1
Date: 3/19/2009

PM Concentration:

This example represents the filterable fraction. For other fractions, use the obtained m_n for that particulate fraction.

$$C_o = \frac{m_n \times 15.43}{V_m(\text{std})}$$

$$m_n (\text{g}) = \frac{0.0176}{\quad} \quad V_m(\text{std}) = \frac{74.985}{\quad}$$

$$C_o = \frac{0.0036}{\quad} \text{ gr/dscf}$$

PM Emission Rate:

$$\text{ER lb/hr} = \frac{C_o}{7000} \times Q_{\text{std(dry)}} \times 60$$

$$\text{ER lb/mmBtu} = \frac{C_o}{7000} \times F_d (\text{dscf/mmBtu}) \times \frac{20.9}{20.9 - O_2\%}$$

$$C_o = \frac{0.0036}{\quad} \quad Q_{\text{std(dry)}} = \frac{323522}{\quad}$$

$$\text{ER lb/hr} = \frac{10.043}{\quad} \text{ lb/hr}$$

Platt Environmental Services, Inc

Chain-of-Custody Form

Project Number: <u>M091105</u>	Date Results Required: <u>NORMAL</u>
Client: <u>US STEEL</u>	TAT Required: <u>NORMAL</u>
Plant/Test Location: <u>GARY WORKS</u>	Project Supervisor: <u>CHRIS TREZAK</u>

Sample Number	Sample Date	Sample Point Identification	# of Conts	Sub Lab	Analysis Required	Volume, mls
021	3-17	#3 DISCHARGE STACK TEST #1	2		M-5	
022	3-17	TEST #2	2		M-5	
023	3-17	TEST #3	2		M5	
024	3-19	BF #14 CASTHOUSE BAGHOUSE STACK TEST #1	2		M5	
025	3-19	TEST #2	2		M5	
026	3-19	TEST #3	2		M5	
027	3-20	#1 DISCHARGE STACK TEST #1	2		M5	
028	3-20	TEST #2	2		M5	
029	3-20	TEST #3	2		M5	
030	3-20	ACETONE BLANK	1		M5	
031						
032						
033						
034						
035						
036						
037						
038						
039						
040						

Delivered to Lab by: 	Date/Time: <u>3-28 11:00</u>	Received by: <u>Jane Macchione</u>	Date/Time: <u>3/24 9:00</u>	Processed by: <u>Jane Macchione</u>	Date/Time: <u>3/26/09 10:00am</u>
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Laboratory Notes:

Company: US Steel Gary Works
Plant: No. 14 Blast Furnace
Test Location: Casthouse Baghouse Stack
Analysis Date: 3/26/2009

Analyst: JM

Description	ID#	vol.	Initial Weight	Final Weight	Net Weight Gain
Test No. 1					
Filter Pan					
Filter	2193		0.3441	0.3463	0.0022
Acetone Wash	3002	89 mls	5.2283	5.2437	0.0154
Acetone Blank					0.0000
Total Acetone Fraction					0.0154
Total Front Half Weight					0.0176
Test No. 2					
Filter Pan					
Filter	2194		0.3453	0.3479	0.0026
Acetone Wash	3003	92 mls	5.2353	5.2436	0.0083
Acetone Blank					0.0000
Total Acetone Fraction					0.0083
Total Front Half Weight					0.0109
Test No. 3					
Filter Pan					
Filter	2191		0.3457	0.3487	0.0030
Acetone Wash	3004	74 mls	5.2202	5.2249	0.0047
Acetone Blank					0.0000
Total Acetone Fraction					0.0047
Total Front Half Weight					0.0077
Blank Summary					
Acetone Wash	3241	100 mls	2.5685	2.5685	0.0000

Company: US Steel Gary Works
Plant: No. 14 Blast Furnace
Test Location: Casthouse Baghouse Stack
Test Method: M5
Test Engineer: DCR
Test Technician: CST/ASHV
lb/mmBtu Emissions by:
Type of Fuel Firing:
Heat Input, mmBtu/hr: Enter Here or For Each Run
Temp ID: CM16
Meter ID: CM16
Pitot ID: 008A
Pitot Tube Coefficient: 0.840
Probe Length: 13.0 ft
Probe Liner Material: Stainless-Steel
Nozzle Diameter: 0.264 in.
Nozzle Kit ID Number: 6
Meter Calibration Factor (Y): 0.994
Meter Orifice Setting (Delta H): 1.616
Sample Plane: Horizontal
Port Length: 7.00 in.
Port Size (diameter): 3.00 in.
Port Type: Flange
Duct Shape: Circular
Diameter: 13 ft

Duct Area: 132.732 Sq. Ft.
Number of Ports Sampled: 2
Number of Points per Port: 12
Minutes per Point: 3.0
Total Number of Traverse Points: 24
Test Length: 72 min.
Train Type: Hot Box
Source Condition: 1 Fan Only

of Runs 3

Company: US Steel Gary Works
Plant: No. 14 Blast Furnace
Location: Casthouse Baghouse Stack
Test Method: M5

	RUN 1		
	<u>Filterable</u>	<u>Condensable</u>	
Sample ID:			
Item:	Filter		
PM, grams (net) collected:	0.0176		

	RUN 2		
	<u>Filterable</u>	<u>Condensable</u>	<u>Total</u>
Sample ID:			
Item:	Filter		
PM, grams (net) collected:	0.0109		

	RUN 3		
	<u>Filterable</u>	<u>Condensable</u>	<u>Total</u>
Sample ID:			
Item:	Filter		
PM, grams (net) collected:	0.0077		

PLATT ENVIRONMENTAL SERVICES, INC.

Procedures for Calibration

Dry Gas Meters

The test meters are calibrated according to Method 5, Section 5.3 and "Procedures for Calibrating and Using Dry Gas Volume Meters as Calibration Standards" by P.R. Westlin and R.T. Shigehara, March 10, 1978.

Analytical Balance

The accuracy of the analytical balance is checked with Class S, Stainless Steel Type 303 weights manufactured by F. Hopken and Son, Jersey City, New Jersey.

Temperature Sensing Devices

The potentiometer and thermocouples are calibrated utilizing a NBS traceable millivolt source.

Nozzles

The nozzles are measured according to Method 5, Section 5.1.

Pitot Tubes

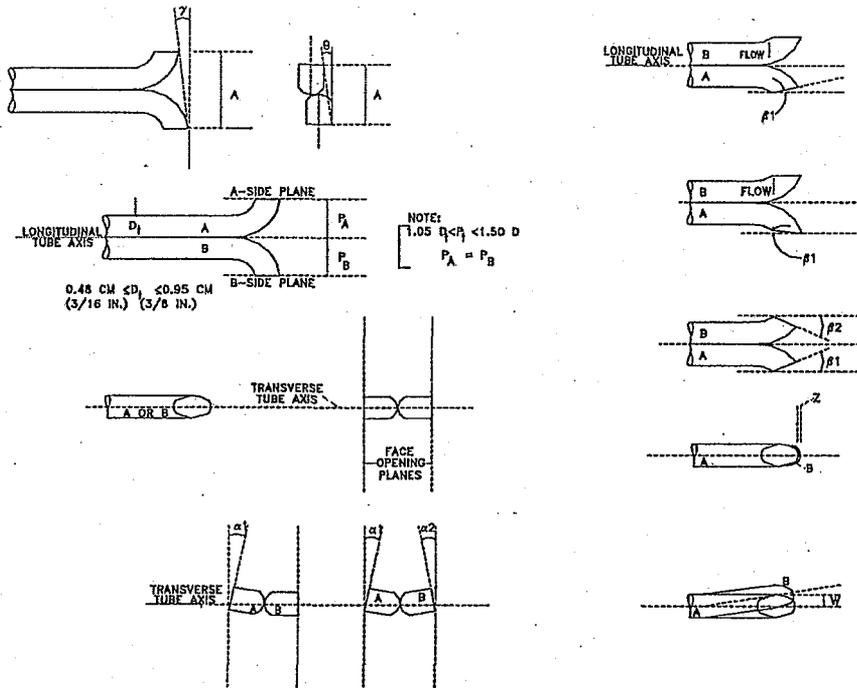
The pitot tubes used during this test program are fabricated according to the specification described and illustrated in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1 through 5 as published in the Federal Register, Volume 42, No. 160; hereafter referred to by the appropriate method number. The pitot tubes comply with the alignment specifications in Method 2, Section 4; and the pitot tube assemblies are in compliance with specifications in the same section.

S TYPE PITOT TUBE INSPECTION FORM

Pitot Tube Nc 8

Date: 1/9/2009

Inspectors Name: AC



Pitot tube assembly level? yes no

Pitot tube openings damaged? yes (explain below) no

$a_1 = 1^\circ (<10^\circ)$

$a_2 = 1^\circ (<10^\circ)$

$z = A \sin g = 0.017$ (In.); (<0.125 In.)

$b_1 = 1^\circ (<5^\circ)$

$b_2 = 0^\circ (<5^\circ)$

$w = A \sin q = 0.000$ (In.); (<0.03125 In.)

$\gamma = 1^\circ, \theta = 0^\circ, A = 0.956$ (In.)

$P_A = 0.478$ (In.), $P_B = 0.478$ (In.), $D_t = 0.375$ (In.)

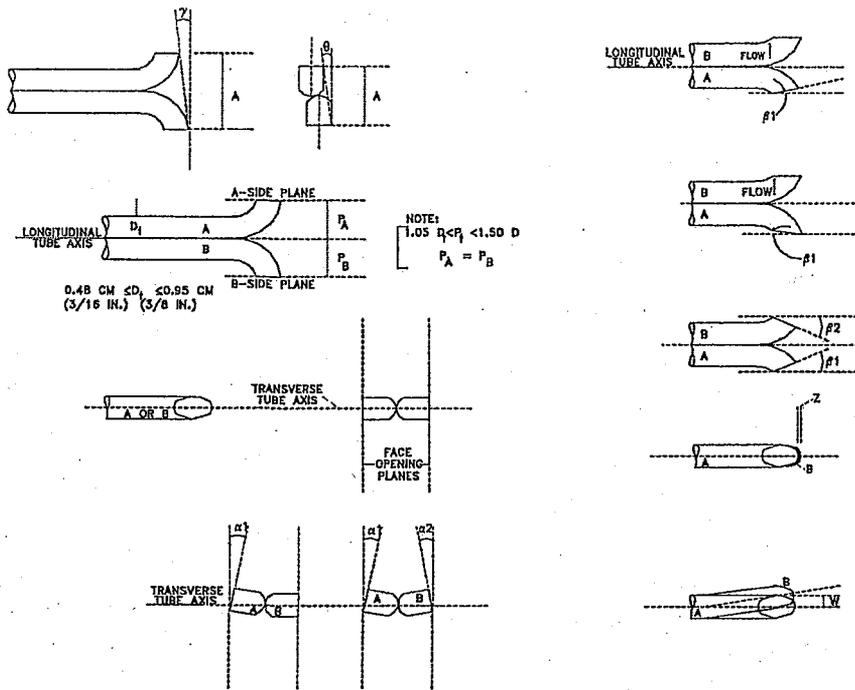
Calibration required? yes no

S TYPE PITOT TUBE INSPECTION FORM

Pitot Tube No 8

Date: 4/3/2009

Inspectors Name: SD



Pitot tube assembly level? yes no

Pitot tube openings damaged? yes (explain below) no

$a_1 = 2^\circ (<10^\circ)$,

$a_2 = 2^\circ (<10^\circ)$

$z = A \sin g = 0.000$ (in.); (<0.125 in.)

$b_1 = 1^\circ (<5^\circ)$,

$b_2 = 1^\circ (<5^\circ)$

$w = A \sin q = 0.008$ (in.); (<0.03125 in.)

$\gamma = 0^\circ$, $\theta = 0.5^\circ$, $A = 0.949$ (in.)

$P_A = 0.474$ (in.), $P_B = 0.475$ (in.), $D_1 = 0.375$ (in.)

Calibration required? yes no

Meter Box Calibration

Dry Gas Meter No. CM116
 Standard Meter No. 14159239
 Standard Meter (Y) 0.9973

Date: February 13, 2009
 Calibrated By: DCR
 Barometric Pressure: 29.75

Run Number	Orifice Setting in H ₂ O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdf	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final		66.132	7.063	57	66	63					
Initial		61.130	1.978	57	67	65					
Difference	1	5.002	5.085	57	67	64	65	19	0	0.999	1.564
Final		55.628	96.379	57	65	61					
Initial		49.483	90.142	57	64	59					
Difference	2	6.145	6.237	57	65	60	62	15	0	0.994	1.624
Final		49.483	90.142	57	64	59					
Initial		41.760	82.327	57	59	57					
Difference	3	7.723	7.815	57	62	58	60	15	30	0.992	1.544
Final		61.130	101.978	57	67	65					
Initial		55.628	96.379	57	65	61					
Difference	4	5.502	5.599	57	66	63	65	10	0	0.995	1.613
Final		72.793	13.883	57	69	64					
Initial		66.132	7.063	57	66	63					
Difference	5	6.661	6.820	57	68	64	66	10	30	0.990	1.615
Final		78.313	19.513	57	73	65					
Initial		72.793	13.883	57	69	64					
Difference	6	5.520	5.630	57	71	65	68	7	0	0.996	1.735

Average 0.994 1.616

Stack Temperature Sensor Calibration

Meter Box #: CM16 Name: DCR
 Ambient Temperature: 57 °F Date: February 13, 2009
 Calibrator Model #: CL23A
 Serial #: T-276953
 Date Of Certification: November 3, 2008

Primary Standards Directly Traceable National Institute of Standards and Technology (NIST)

Reference Source Temperature (°F)	Test Thermometer Temperature (°F)	Temperature Difference %
0	0	0.0
250	250	0.0
600	600	0.0
1200	1201	0.1

$$\frac{(\text{Ref. Temp., } ^\circ\text{F} + 460) - (\text{Test Therm. Temp., } ^\circ\text{F} + 460)}{\text{Ref. Temp., } ^\circ\text{F} + 460} * 100 \leq 1.5 \%$$

Meter Box Calibration

Dry Gas Meter No.
Standard Meter No.
Standard Meter (Y)

CM-16
14159239
0.9973

Date:
Calibrated By:
Barometric Pressure:

March 30, 2009
DCR
29.89

Run Number	Orifice Setting in H ₂ O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final		110.530	98.160	58	73	70					
Initial		105.058	92.493	58	76	71					
Difference 1	0.20	5.472	5.667	58	75	71	73	20	30	0.992	1.499
Final		95.112	82.173	58	72	70					
Initial		87.433	74.243	58	75	70					
Difference 2	0.50	7.679	7.930	58	74	70	72	18	30	0.993	1.552
Final		79.618	66.173	60	74	69					
Initial		71.431	57.759	58	75	70					
Difference 3	0.70	8.187	8.414	59	75	70	72	17	0	0.996	1.620
Final		71.431	57.759	60	75	69					
Initial		65.183	51.328	60	74	68					
Difference 4	0.90	6.248	6.431	60	75	69	72	11	30	0.991	1.644
Final		87.433	74.243	60	75	70					
Initial		79.618	66.173	60	74	70					
Difference 5	1.20	7.815	8.070	60	75	70	72	12	30	0.988	1.653
Final		10.530	98.160	60	73	70					
Initial		5.058	92.493	60	76	71					
Difference 6	2.00	5.472	5.667	60	75	71	73	7	0	0.984	1.761
Average										0.991	1.622

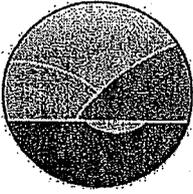
Stack Temperature Sensor Calibration

Meter Box #: CM-16 Name: DCR
 Ambient Temperature: 60 °F Date: March 30, 2009
 Calibrator Model #: CL23A
 Serial #: T-276953
 Date Of Certification: November 3, 2008

Primary Standards Directly Traceable National Institute of Standards and Technology (NIST)

Reference Source Temperature (°F)	Test Thermometer Temperature (°F)	Temperature Difference %
0	0	0.0
250	250	0.0
600	600	0.0
1200	1200	0.0

$$\frac{(\text{Ref. Temp., } ^\circ\text{F} + 460) - (\text{Test Therm. Temp., } ^\circ\text{F} + 460)}{\text{Ref. Temp., } ^\circ\text{F} + 460} * 100 \leq 1.5 \%$$



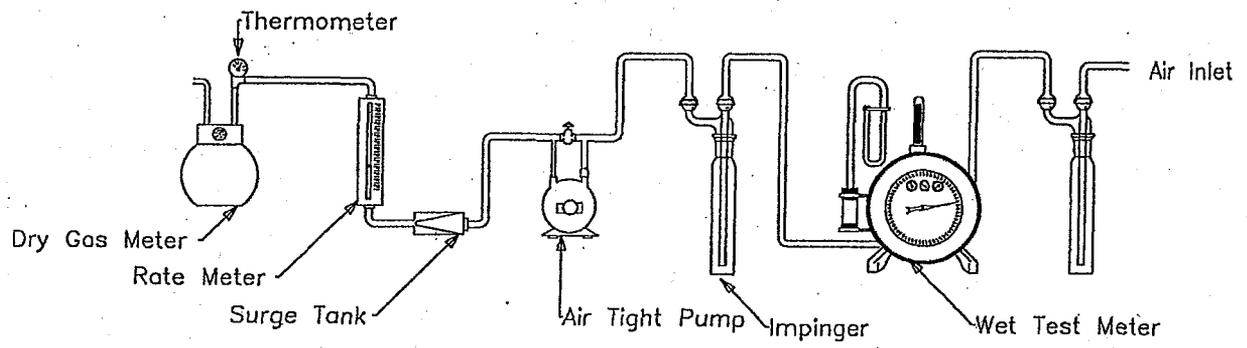
Platt Environmental Services, Inc.

1520 Kensington Road, Suite 204
Oak Brook, IL 60523-2139
630-521-9400
630-521-9494 fax

Nozzle Calibration Sheet Set No. 3

Nominal Diameter	0.120	0.175	0.200	0.230	0.250	0.275	0.310	0.375	0.425	0.500	Other
Nozzle Diameter	.120	.178	.215	.236	.264	.278	.320	.363	.433	.499	
Nozzle Identification Number	2-4	2-6	#7	4-8M	#8	4-9	2-10	2-12	2-14	7-16	

Dry Gas Meter Calibration Sample Train Diagram



Isokinetic Sampling Cover Sheet

Run Number: 1 Plant Information
 Test Location: 214 BP Baghouse Date: 03/19/09
 Duct Shape: Circular or Rectangular Client Name: US Steel
 Source Condition: Normal or Fan Length: 5 Width: or
 Port Type: Flange Test Method: 5 Port Length: 7"
 Project Number: M091105 B
 Plant Name: Gary Wankers
 Diameter: 13"
 Flue Area: 132.732
 Port Diameter: 3"

Operator: DCR Test Tech: AS/KAD Meter and Probe Data
 Pitot ID: 008A Meter ID: CM16
 Probe Liner: SS Pitot Coefficient: 0.340
 Filter Number/Weight: 2193 0.3441 Nozzle Diameter: 0.238
 Pre-Test Nozzle Leak Check: 0.0 @ 10 "Hg Thimble Number/Weight: or
 Pre-Test Pitot Leak Check: 0/3" @ 10 "H₂O Post-Test Nozzle Leak Check: 0.6 @ 15 "Hg
 Post-Test Pitot Leak Check: 0/3" @ 15 "H₂O

Ports Sampled: 2 Points/Port: 12 Min./Point: 3
 Total Points: 24 Total Test Time: 72 Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.89 Static Pressure: -0.2 Determined by: Method 3 or Method 3A
 CO₂ %: 0.1 / Avg. 0.1 O₂ %: 20.9 / Avg. 20.9
 Initial Imp. Volume or Weight: 200 Final Imp. Volume or Weight: 201
 Initial Silica Weight: 212.2 Final Silica Weight: 213.7
 Balance used for impingers and/or silica weights (Model and S/N): or Silica Weight Gain: 1.5
 Nozzle Kit ID: or

Comments:

One Fan Running During Test

Isokinetic Sampling Field Data Sheet

Project Number: M091105B Date: 03/19/09 Test Number: 1
 Client: US Steel Test Location: #1 Blast Furnace Operator: DCR/ASHAV
 Plant: Gary Works Test Method: 5 Page Number: 1 of 1

Port-Point #	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume Actual (V _m) ft ³	Square Root ΔP	Meter Rate, Cubic Feet/Min.	Theoretical Meter Volume (V _m) ft ³ per point	Theoretical Meter Volume (V _m) ft ³ total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp, °F	Filter Temp, °F	Impinger Outlet Well Temp °F
1-1	8:03	0.45	2.4	55.350	0.671	0.902	2.705		101	50	48	5	250	251	44
2	8:06	0.52	2.7	58.040	0.721	0.976	2.929	58.055	101	50	49	5	249	250	45
3	8:09	0.48	2.6	60.984	0.683	0.938	2.814	60.984	98	51	49	5	248	250	45
4	8:12	0.46	2.5	63.750	0.678	0.918	2.755	63.798	96	52	49	5	250	251	45
5	8:15	0.47	2.5	66.550	0.686	0.929	2.785	66.553	94	53	49	5	251	250	46
6	8:18	0.42	2.2	69.330	0.648	0.883	2.648	69.338	93	53	49	5	251	250	46
7	8:21	0.44	2.4	71.980	0.663	0.903	2.710	71.986	93	53	49	5	250	250	46
8	8:24	0.51	2.8	74.690	0.714	0.973	2.918	74.696	90	53	49	5	251	250	46
9	8:27	0.79	4.3	77.610	0.889	1.211	3.632	77.614	89	53	49	7	251	250	46
10	8:30	0.81	4.4	81.240	0.9	1.226	3.677	81.246	89	53	49	7	251	250	47
11	8:33	0.75	4.05	84.923	0.866	1.180	3.539	84.923	88	53	49	7	251	250	47
12	8:36	0.68	3.7	88.460	0.825	1.123	3.369	88.462	88	53	49	6	251	250	47
	8:39			91.680				91.871							
2-1	8:41	0.38	2.1	91.680	0.616	0.846	2.519		87	51	48	5	251	250	48
2	8:44	0.42	2.3	94.010	0.648	0.883	2.648	94.038	87	51	48	5	251	250	48
3	8:47	0.39	2.1	96.680	0.624	0.851	2.552	96.686	86	51	48	5	249	251	48
4	8:50	0.45	2.4	99.230	0.671	0.914	2.741	99.238	85	51	48	5	251	250	48
5	8:53	0.42	2.3	101.970	0.648	0.883	2.648	101.979	85	51	48	5	251	249	48
6	8:56	0.48	2.6	104.620	0.693	0.944	2.831	104.627	84	51	48	5	250	248	47
7	8:59	0.54	2.9	107.450	0.735	1.001	3.063	107.458	84	51	48	5	250	249	47
8	9:02	0.65	3.5	110.460	0.866	1.098	3.294	110.461	83	51	48	5	251	252	46
9	9:05	0.72	3.9	113.740	0.849	1.156	3.367	113.753	83	51	47	5	251	250	46
10	9:08	0.78	4.2	117.200	0.883	1.203	3.609	117.222	82	51	47	6	250	249	46
11	9:11	0.77	4.2	120.820	0.877	1.195	3.585	120.831	82	51	47	6	250	251	46
12	9:14	0.67	3.6	124.410	0.819	1.115	3.345	124.416	81	51	47	6	249	247	46
	9:17			127.744				127.761							

Isokinetic Sampling Cover Sheet

Run Number: 2 Plant Information Project Number: M091105B
 Test Location: #WRE Backbase Steel Plant Name: Gary Worker
 Duct Shape: Circular or Rectangular Diameter: 13"
 Source Condition: Normal - 1 Fea Only Flue Area: 152.732
 Port Type: Flange Port Diameter: 3"

Operator: DCR Test Tech: ASAPD Meter Y Value: 0.994 ΔH Value: 1.616
 Pitot ID: 008A Pitot Coefficient: 0.840 Probe Length: 13
 Probe Liner: SS Nozzle Diameter: 0.264 Train Type: Anderson
 Filter Number/Weight: 2194 0.3453 Thimble Number/Weight: _____
 Pre-Test Nozzle Leak Check: 0.0 @ 10 "Hg Post-Test Nozzle Leak Check: 0.0 @ 10 "Hg
 Pre-Test Pitot Leak Check: 0/34 "H₂O Post-Test Pitot Leak Check: 0/31 "H₂O

Traverse Data

Ports Sampled: 2 Points/Port: 12 Min./Point: 3
 Total Points: 24 Total Test Time: 72 Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.77 Static Pressure: -0.2
 CO₂ %: 0.11 / Avg. 0.1 O₂ %: 20.91 / Avg. 20.9 Determined by: Method 3 or Method 3A
 Initial Imp. Volume or Weight: 2.00 Final Imp. Volume or Weight: 200 Imp. Volume or Weight Gain: 0
 Initial Silica Weight: 209.5 Final Silica Weight: 220.9 Silica Weight Gain: 11.4
 Balance used for impingers and/or silica weights (Model and S/N): _____ Nozzle Kit ID: 6

Comments:

1 Fan Running
 Change Nozzle to 0.264

Isokinetic Sampling Field Data Sheet

Project Number: M091105B Date: 03/19/89 Test Number: 2
 Client: US Steel - Gary Works Test Location: #14 of Baghouse Operator: DCR/ASHAW
 Plant: Gary Works Test Method: 5 Page Number: 1 of 1

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume Actual (Vm) ft ³	Square Root ΔP	Meter Rate, Cubic Feet/Min.	Theoretical Meter Volume (Vm) ft ³ per point	Theoretical Meter Volume (Vm) ft ³ total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp, °F	Filter Temp, °F	Impinger Outlet Well Temp °F
1-1	9:30	0.40	2.0	27.902	0.632	0.777	2.330		80	53	44	6	247	250	38
2	9:33	0.45	2.0	30.830	0.671	0.824	2.471	30.232	80	53	44	6	248	250	38
3	9:36	0.48	2.1	32.700	0.693	0.857	2.552	32.703	80	54	44	6	249	251	38
4	9:39	0.53	2.4	35.250	0.728	0.894	2.682	35.255	80	55	44	6	248	252	39
5	9:42	0.49	2.2	37.930	0.700	0.860	2.579	37.937	79	56	44	6	249	251	39
6	9:45	0.48	2.1	40.570	0.693	0.857	2.552	40.516	79	58	45	6	251	253	40
7	9:48	0.53	2.4	43.060	0.728	0.894	2.682	43.028	79	58	45	6	252	252	40
8	9:51	0.64	2.9	45.720	0.800	0.982	2.947	45.750	79	59	45	6	251	251	41
9	9:54	0.73	3.3	48.620	0.854	1.069	3.209	48.697	79	60	46	7	251	250	42
10	9:57	0.87	3.7	51.890	0.902	1.134	3.401	51.906	79	60	46	7	248	249	42
11	10:00	0.85	3.8	55.290	0.922	1.154	3.462	55.387	79	60	46	7	249	248	42
12	10:03	0.80	3.6	58.760	0.884	1.120	3.359	58.770	79	60	46	7	248	249	42
10:06				62.120				62.121							
1-1	10:08	0.45	2.0	62.120	0.671	0.840	2.520		81	59	47	5	250	251	42
2	10:11	0.48	2.2	64.649	0.693	0.867	2.602	64.649	81	57	47	5	250	252	42
3	10:14	0.53	2.4	67.240	0.728	0.911	2.734	67.251	80	59	48	6	250	252	43
4	10:17	0.49	2.2	69.980	0.700	0.876	2.629	69.985	80	59	48	6	250	251	43
5	10:20	0.43	1.9	72.610	0.656	0.821	2.463	72.614	80	59	47	6	250	251	43
6	10:23	0.37	1.7	74.870	0.608	0.762	2.285	74.859	80	59	47	6	250	250	43
7	10:26	0.55	2.5	77.180	0.742	0.929	2.786	77.184	80	59	49	6	250	251	43
8	10:29	0.64	2.9	79.960	0.800	1.062	3.005	79.970	80	59	49	6	250	251	43
9	10:32	0.75	3.3	82.970	0.866	1.089	3.252	82.975	80	59	49	6	250	250	43
10	10:35	0.83	3.7	86.220	0.911	1.141	3.422	86.228	80	59	49	6	250	251	43
11	10:38	0.88	4.0	88.646	0.938	1.174	3.523	88.650	80	59	49	6	250	250	43
12	10:41	0.72	3.2	93.170	0.849	1.062	3.187	93.173	80	59	49	6	250	251	43
10:44				96.340				96.360							

Isokinetic Sampling Cover Sheet

Run Number: 3 Plant Information Project Number: M091105B
 Test Location: RF Baghouse Stack Client Name: Gary Works
 Duct Shape: Circular or Rectangular Length: 13' Diameter: 13"
 Source Condition: Normal Test Method: 5' Flue Area: 152.732
 Port Type: Flange Port Length: 7" Port Diameter: 3"

Operator: DCR Test Tech: ASHAV Meter ID: CM16 Meter Y Value: 0.994 ΔH Value: 1.616
 Pitot ID: 008A Pitot Coefficient: 0.840 Probe Length: 13'
 Probe Liner: 55 Nozzle Diameter: 0.264 Train Type: Hot Box
 Filter Number/Weight: 2151 / 0.3457 Thimble Number/Weight: _____
 Pre-Test Nozzle Leak Check: 0.0 @ 10 "Hg Post-Test Nozzle Leak Check: 0.0 @ 10 "Hg
 Pre-Test Pitot Leak Check: 0/3' "H₂O Post-Test Pitot Leak Check: 0/3' "H₂O

Ports Sampled: 2 Points/Port: 1.2 Min./Point: 3
 Total Points: 24 Total Test Time: 72 Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.89 Static Pressure: -0.2 Determined by: Method 3 or Method 3A
 CO₂ %: 0.1 / Avg. 0.1 / O₂ %: 20.91 / Avg. 20.9
 Initial Imp. Volume or Weight: 2.65 Final Imp. Volume or Weight: 2.65 Imp. Volume or Weight Gain: 0
 Initial Silica Weight: 211.3 Final Silica Weight: 224.3 Silica Weight Gain: 13.0
 Balance used for impingers and/or silica weights (Model and S/N): _____ Nozzle Kit ID: 6

Comments:

Change Nozzle to 0.264

Isokinetic Sampling Field Data Sheet

Project Number: M091105B Date: 03/19/09 Test Number: 3
 Client: OS Steel Test Location: M5 Operator: DKR
 Plant: Cory Works Test Method: APF Backwash Page Number: 1 of 1

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume Actual (V _m) ft ³	Square Root, ΔP	1.245 Meter Rate, Cubic Feet/Min.	Theoretical Meter Volume, (V _m) ft ³ , per point	Theoretical Meter Volume, (V _m) ft ³ , total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, "Hg	Probe Temp, °F	Filter Temp, °F	Impinger Outlet Well Temp, °F
1-1	10:57	0.45	2.0	96.763	0.671	0.835	2.505		79	52	47	5	247	251	40
2	10:00	0.48	2.2	99.260	0.693	0.863	2.587	99.269	79	52	47	5	248	252	40
3	11:03	0.51	2.3	101.850	0.714	0.889	2.667	101.857	79	53	47	5	249	251	40
4	11:06	0.54	2.5	104.520	0.735	0.915	2.745	104.524	79	53	47	5	249	250	40
5	11:09	0.46	2.1	107.260	0.678	0.844	2.583	107.269	79	53	47	5	251	248	40
6	11:12	0.48	2.2	109.790	0.693	0.863	2.588	109.862	79	54	48	5	250	250	40
7	11:15	0.52	2.4	112.380	0.721	0.899	2.693	112.390	79	53	47	5	249	250	41
8	11:18	0.63	2.9	115.030	0.794	0.988	2.965	115.083	79	52	47	5	250	249	41
9	11:21	0.74	3.3	118.040	0.860	1.070	3.213	118.048	79	52	47	5	251	248	41
10	11:24	0.86	3.9	121.260	0.927	1.155	3.464	121.261	79	52	47	5	250	249	41
11	11:27	0.89	4.0	124.720	0.943	1.175	3.524	124.725	79	52	47	5	249	251	41
12	11:30	0.82	3.7	128.290	0.906	1.127	3.382	128.249	79	52	47	5	249	250	41
	11:33			131.598				131.631							
2-1	11:35	0.44	2.0	131.598	0.663	0.826	2.478		78	52	47	5	248	250	41
2	11:38	0.49	2.2	134.100	0.700	0.872	2.615	134.109	78	52	47	5	249	250	41
3	11:41	0.54	2.4	136.720	0.735	0.915	2.745	136.724	78	52	47	5	250	252	41
4	11:44	0.47	2.1	139.460	0.686	0.854	2.561	139.469	78	52	47	5	250	251	41
5	11:47	0.43	1.9	142.000	0.656	0.816	2.449	142.030	78	52	47	5	250	250	41
6	11:50	0.49	2.2	144.470	0.700	0.872	2.615	144.479	78	52	47	5	250	250	41
7	11:53	0.54	2.5	147.050	0.735	0.915	2.745	147.054	78	52	47	5	250	251	41
8	11:56	0.50	2.3	149.360	0.718	0.882	2.785	149.839	78	52	47	5	250	250	41
9	11:59	0.62	2.8	152.620	0.787	0.980	2.941	152.634	78	52	47	5	250	250	41
10	12:02	0.72	3.3	155.570	0.849	1.056	3.169	155.575	78	52	47	5	250	250	41
11	12:05	0.75	3.4	158.740	0.866	1.078	3.234	158.744	78	52	47	5	250	251	41
12	12:08	0.67	2.8	161.970	0.787	0.980	2.941	161.970	78	52	46	5	251	252	43
	12:11			164.524				164.519							



OCS Environmental, Inc.
Method 9 VE Inspection Form

STACK TEST
1ST RUN

Page 1 of 2

Date: 02-19-09
 Source: #14 BF Roof
 Observation Start Time: 08:03
 Observation End Time: 08:59
 Observer's Position: 14 BF 3
 Distance to source: 540 YARD
 Direction to source: NW
 Height of source: 121'
 Vertical angle to source: 4°

Emissions color:	AS NOTED	SAME
Background:	SKY	
Sky Conditions:	CLEAR	
Wind Speed:	0	
Wind Direction:	NW	
Ambient Temp:	40°	
Relative Humidity%:	54%	
Wet Bulb Temp:		

Plume Type: Attached Detached None

Comments	0	15	30	45		0	15	30	45	Comments	
					0	30	0	0	0	0	
					1	31	0	0	0	0	
					2	32	0	0	0	0	
	0	0	0	0	3	33	0	0	0	0	
	0	0	0	0	4	34	0	0	0	0	
	0	0	0	0	5	35	0	0	0	0	
	0	0	0	0	6	36	0	0	0	0	
	0	0	0	0	7	37	0	0	0	0	
	0	0	0	0	8	38	0	0	0	0	
	0	0	0	0	9	39	0	0	0	0	
	0	0	0	0	10	40	0	0	0	0	
	0	0	0	0	11	41	0	0	0	0	
	0	0	0	0	12	42	0	0	0	0	
	0	0	0	0	13	43	0	0	0	0	
	0	0	0	0	14	44	0	0	0	0	
	0	0	0	0	15	45	0	0	0	0	
	0	0	0	0	16	46	0	0	0	0	
	0	0	0	0	17	47	0	0	0	0	
	0	0	0	0	18	48	0	0	0	0	
	0	0	0	0	19	49	0	0	0	0	
	0	0	0	0	20	50	0	0	0	0	
	0	0	0	0	21	51	0	0	0	0	
	0	0	0	0	22	52	0	0	0	0	
	0	0	0	0	23	53	0	0	0	0	
	0	0	0	0	24	54	0	0	0	0	
	0	0	0	0	25	55	0	0	0	0	
	0	0	0	0	26	56	0	0	0	0	
	0	0	0	0	27	57	0	0	0	0	
	0	0	0	0	28	58	0	0	0	0	
	0	0	0	0	29	59	0	0	0	0	

Additional info (include steam dissipation point)

Observer's Signature

Danny Wall



OCS Environmental, Inc.
 Method 9 VE Inspection Form
 #14 BF STACK TEST
 1st Run

Date: 03-19-09
 Source: #14 BF Roof
 Observation Start Time: 09:00
 Observation End Time: 09:02:45
 Observer's Position: #14 BF 3
 Distance to source: 540 yds
 Direction to source: NW
 Height of source: 121'
 Vertical angle to source: 4°

Emissions color:	<u>AS NOTED</u>	End	<u>SAME</u>
Background:	<u>SKY</u>		
Sky Conditions:	<u>CLEAR</u>		
Wind Speed:	<u>2</u>		
Wind Direction:	<u>NW</u>		
Ambient Temp:	<u>40°</u>		
Relative Humidity%:	<u>54%</u>		
Wet Bulb Temp:	<u>-</u>		

Plume Type: Attached Detached None

Comments	0	15	30	45		0	15	30	45	Comments
	0	0	0	0	0	30				
	0	0	0	0	1	31				
	0	0	0	0	2	32				
					3	33				
					4	34				
					5	35				
					6	36				
					7	37				
					8	38				
					9	39				
					10	40				
					11	41				
					12	42				
					13	43				
					14	44				
					15	45				
					16	46				
					17	47				
					18	48				
					19	49				
					20	50				
					21	51				
					22	52				
					23	53				
					24	54				
					25	55				
					26	56				
					27	57				
					28	58				
					29	59				

Additional info (include steam dissipation point)

 Observer's Signature
Danny Wash



OCS Environmental, Inc.
Method 9 Source Layout Sketch
#14 BF. STACK TEST
1st Run

Date: 03 11 09

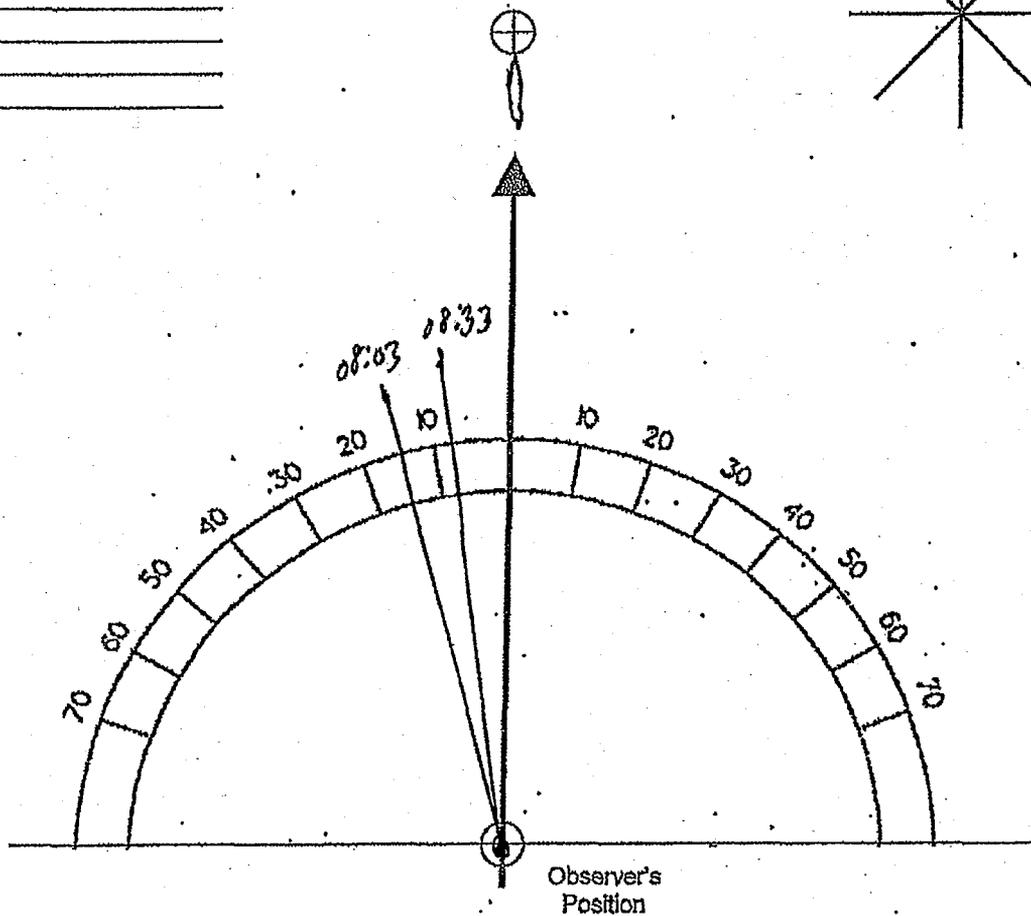
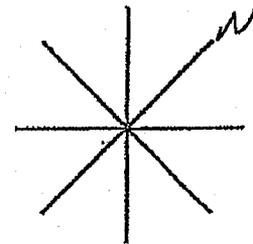
Observer Name: Walsh

Begin Time: 08:03

Time End: 09:02:45

No Sun Visible Times

Observation Point



Signature: Dan Walsh



OCS Environmental, Inc.
 Method 9 VE Inspection Form
 #14 BF STACK TEST
 2nd Run

Date: 03-19-09
 Source: #14 BF ROOF
 Observation Start Time: 09:30
 Observation End Time: 09:59:45
 Observer's Position: 14 BF 3
 Distance to source: 540 YARDS
 Direction to source: NW
 Height of source: 121'
 Vertical angle to source: 4'

Emissions color: AS NOTED | End: SAME
 Background: SKY
 Sky Conditions: CLEAR
 Wind Speed: 8
 Wind Direction: NW
 Ambient Temp: 46°
 Relative Humidity%: 54%
 Wet Bulb Temp: → | ←

Plume Type: Attached Detached None

Comments	0	15	30	45		0	15	30	45	Comments	
					0	30	0	0	0	0	
					1	31	0	0	0	0	
					2	32	0	0	0	0	
					3	33	0	0	0	0	
					4	34	0	0	0	0	
					5	35	0	0	0	0	
					6	36	0	0	0	0	
					7	37	0	0	0	0	
					8	38	0	0	0	0	
					9	39	0	0	0	0	
					10	40	0	0	0	0	
					11	41	0	0	0	0	
					12	42	0	0	0	0	
					13	43	0	0	0	0	
					14	44	0	0	0	0	
					15	45	0	0	0	0	
					16	46	0	0	0	0	
					17	47	0	0	0	0	
					18	48	0	0	0	0	
					19	49	0	0	0	0	
					20	50	0	0	0	0	
					21	51	0	0	0	0	
					22	52	0	0	0	0	
					23	53	0	0	0	0	
					24	54	0	0	0	0	
					25	55	0	0	0	0	
					26	56	0	0	0	0	
					27	57	0	0	0	0	
					28	58	0	0	0	0	
					29	59	0	0	0	0	

Additional Info (include steam dissipation point)

Observer's Signature

Doug Welch



OCS Environmental, Inc.
 Method 9 VE Inspection Form
 #14 BF STACK TEST
 2nd Run

Date: 03-19-09
 Source: #14 BF Roof
 Observation Start Time: 10:00
 Observation End Time: 10:29:45
 Observer's Position: 14 BF 3
 Distance to source: 540 YARDS
 Direction to source: NW
 Height of source: 12.1'
 Vertical angle to source: 4°

Start	End
<u>AS NOTED</u>	<u>SAME</u>
<u>SKY</u>	
<u>CLEAR</u>	
<u>8</u>	
<u>NW</u>	
<u>40°</u>	
<u>54%</u>	<u>↓</u>
<u>-</u>	<u>↓</u>

Plume Type: Attached Detached None

Comments	0	15	30	45		0	15	30	45	Comments
	0	0	0	0	0	30				
	0	0	0	0	1	31				
	0	0	0	0	2	32				
	0	0	0	0	3	33				
	0	0	0	0	4	34				
	0	0	0	0	5	35				
	0	0	0	0	6	36				
	0	0	0	0	7	37				
	0	0	0	0	8	38				
	0	0	0	0	9	39				
	0	0	0	0	10	40				
	0	0	0	0	11	41				
	0	0	0	0	12	42				
	0	0	0	0	13	43				
	0	0	0	0	14	44				
	0	0	0	0	15	45				
	0	0	0	0	16	46				
	0	0	0	0	17	47				
	0	0	0	0	18	48				
	0	0	0	0	19	49				
	0	0	0	0	20	50				
	0	0	0	0	21	51				
	0	0	0	0	22	52				
	0	0	0	0	23	53				
	0	0	0	0	24	54				
	0	0	0	0	25	55				
	0	0	0	0	26	56				
	0	0	0	0	27	57				
	0	0	0	0	28	58				
	0	0	0	0	29	59				

Additional Info (include steam dissipation point)

Observer's Signature

D. Wash